

Claims

We Claim:

1. A device, comprising:
 - a) a implantable pacemaker element;
 - 5 b) a implantable defibrillator element connected to said pacemaker element;
and
 - c) a plurality of atrial and ventricular pacing leads connected to said
pacemaker element, wherein said pacing leads are configured for
simultaneous activation.
- 10 2. The device of Claim 1, further comprising a plurality of atrial and ventricular
defibrillation leads connected to said defibrillator element.
3. The device of Claim 1, further comprises a plurality of atrial and ventricular sensing
leads connected to said pacemaker element.
4. The device of Claim 1, wherein said pacemaker element further comprises a storage
15 memory connected to said sensing leads.
5. The device of Claim 1, wherein said device is capable of detecting an earliest arriving
electrical signal.
6. A method, comprising:
 - a) providing:
 - 20 i) a patient implanted with a device, comprising;
 - 1) a implantable pacemaker element; and
 - 2) a plurality of atrial and ventricular pacing leads connected
to said pacemaker element, wherein said pacing leads are

configured for simultaneous activation and coursing to the ventricles and atria; and

ii) a plurality of sensing leads connected to said pacemaker coursing to the ventricles and atria;

b) initiating one or more pacing bursts by said pacemaker element, wherein said ventricles and atria are simultaneously paced; and

c) detecting an earliest arriving electrical signal following termination of said pacing bursts.

7. The method of Claim 6, wherein prior to step b) a cardiac arrhythmia is detected in said patient.

8. The method of Claim 6, wherein said earliest arriving electrical signal is from the ventricles.

9. The method of Claim 6, wherein said earliest arriving electrical signal is from the atria.

10. The method of Claim 6, further comprising step d) defibrillating said ventricles under conditions such that normal sinus rhythm is restored.

11. A method, comprising:

a) providing;

i) a patient;

ii) an electrocardiogram array;

iii) a plurality of intracardiac quadripole catheters, wherein said catheters are configured for simultaneous atrial and ventricular pacing; and

iv) a computer configured to receive electrical signals from said catheters;

- b) placing said array on the skin surface of said patient;
- c) inserting said catheters into said patient;
- d) simultaneously pacing said atria and ventricles; and
- e) detecting with said computer an earliest arriving electrical signal.

- 5 12. The method of Claim 11, wherein said earliest arriving electrical signal is from the ventricles.
13. The method of Claim 11, wherein said earliest arriving electrical signal is from the atria.
- 10 14. The method of Claim 11, wherein said earliest arriving electrical signal is from the junction between the atria and ventricles.
15. The method of Claim 11, further comprising step f) diagnosing said patient as having ventricular tachycardia.
16. The method of Claim 10, further comprising step f) diagnosing said patient as having supraventricular tachycardia.
- 15 17. The method of Claim 10, further comprising step f) diagnosing said patient as having atrioventricular nodal reentrant tachycardia.
18. The method of Claim 10, wherein said computer is connected to a data readout device.
19. A method to detect the origin of a cardiac arrhythmia, comprising:
- 20 a) providing;
- i) a patient exhibiting cardiac arrhythmia;
- ii) a system comprising a plurality of pacing leads and a plurality of sensing leads;

- b) simultaneously pacing the atria and ventricles of said patient; and
- c) sensing with said sensing leads said atrial and ventricular electrical activity after said pacing under conditions such that the earliest arriving electrical signal is detected.

- 5 20. The method of Claim 19, wherein said earliest arriving electrical signal is from the ventricles.
21. The method of Claim 19, wherein said earliest arriving electrical signal is from the atria.
- 10 22. The method of Claim 19, wherein said earliest arriving electrical signal is from the junction between the atria and ventricles.
23. The method of Claim 19, further comprising step d) diagnosing said patient as having ventricular tachycardia.
24. The method of Claim 19, further comprising step d) diagnosing said patient as having supraventricular tachycardia.
- 15 25. The method of Claim 19, further comprising step d) diagnosing said patient as having atrioventricular nodal reentrant tachycardia.
26. The method of Claim 19, wherein said computer is connected to a data readout device.